



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.        | CONFIRMATION NO.       |
|---|-------------|----------------------|----------------------------|------------------------|
| 10/777,108  | 02/13/2004  | Kazuhiro Hayakawa    | 00684.003591               | 5013                   |
| 5514 7590 05/11/2007<br>FITZPATRICK CELLA HARPER & SCINTO<br>30 ROCKEFELLER PLAZA<br>NEW YORK, NY 10112 |             |                      | EXAMINER<br>ANGADI, MAKI A |                        |
|   |             |                      | ART UNIT<br>1765           | PAPER NUMBER           |
|   |             |                      | MAIL DATE<br>05/11/2007    | DELIVERY MODE<br>PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |  |  |
|------------------------------|--------------------------------------|--|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/777,108 | <b>Applicant(s)</b><br>HAYAKAWA ET AL. |  |
|                              | <b>Examiner</b><br>Maki A. Angadi    | <b>Art Unit</b><br>1765                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 2-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/16/2007 has been entered.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 2-7 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, has possession of the claimed invention. The amendment to claim 2 filed on 2/16/2007 contains the following phrase: "having thickness of not less than 100 nm" that is not supported in the specification.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 2-6 are rejected under 35 U.S.C. 103(a) over of Terui (US Patent No. 6,126,271) in view of Sato (US Patent No. 6,245,245).

*As to claim 2*, Terui discloses a method of manufacturing a substrate for an ink jet recording head, wherein said substrate has a supply port, penetrating said substrate, for supplying liquid and an energy generating element for generating energy for ejecting the liquid (col.1, lines 17-35).

Terui discloses a step of forming a protecting film (102) on a surface of said substrate (101) which is opposite from a surface on which said energy generating element is disposed (Fig.6A); a step of etching a surface of said protecting film (col.2, line 1-2); a step of forming an etching-resistant film (108) on

the etched protecting film (102) (col.1, lines 62-65); a step of forming opening patterns (108) in said protecting (102) and said etching-resistance film (108) (Fig.6D) (col.1, lines 64-66); a step of forming an opening as said supply port in said substrate by etching said substrate through said opening pattern (Fig.6D) (col.2, lines 1-2); a step of removing a projected end portion of said protecting film which projected into said opening and which is produced in said opening forming step (Fig.6E) (col.2, lines 1-5); a step of removing said etching-resistance film (Fig.6E).

Terui discloses the use of hydrofluoric (HF) acid for etching of oxide layer (col.2, lines 1-2) but fails to disclose the use of ammonium fluoride. However, Sato discloses the use ammonium fluoride in addition to HF for removing silicon oxide layer (col.5, lines 11-16). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select ammonium fluoride for etching in addition to HF used by Terui because Sato illustrates that the mixture of HF and ammonium fluoride allows etching of both surface and reverse side of the eaves-like remainders unlike usual etching (col.5, lines 15-19).

Terui does not expressly disclose a method of removing the opening formed in side opposite side at the back of the substrate. However, Sato discloses a step, which reads on the process of an opening-forming step on the opposite sides (8) (Fig.1C and 1F) at the back of the silicon substrate containing SiO layer and having energy generating element (col.5, lines 30-36); and

removing etch-resistant film after removing projected end portion (col.5, lines 37-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select the process of removing the eves portion and etch-resistant film in the process employed by Terui because Sato illustrates that the etching process reduces the time of etch in the fabrication of ink jet head (col.5, lines 31-34).

As to claim 3, Terui discloses the use of silicon as a substrate material (col.1, line 50).

*As to claim 4*, Terui discloses that the supply port-forming step uses anisotropic etching (col.1, lines 64-67).

*As to claim 5*, Terui discloses that projected end removing step uses etching (col.2, lines 1-5).

*As to claim 6*, Terui discloses that the protecting film (102) (Fig.6A) consists of silicon oxide (col.1, lines 50-51).

***Claim Rejections - 35 USC § 103***

2. Claim 7 is rejected under 35 U.S.C. 103(a) over Terui (US Patent No. 6,126,271) in view of Sato (US Patent No. 6,245,245) as applied to claim 2, in further view of Rajesh, *Wear* vol. 252, pages 769-776, (2002).

Terui uses photoresist (108) as an etch-resistant layer (Fig.6D). Terui is silent about polyetheramide as an etch-resistant film. However, Rajesh discloses the abrasive wear performance of various polyamides. According to Rajesh, polyetheramide exhibits rubbery form at room temperature (page 772, paragraph 1) and lowest wear rate as a function of load (Fig.2, page 773). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to select polyetheramide as etch-resistant layer in the process cited by Terui because Rajesh illustrates that polyetheramide rubbery form at room temperature (page 772) and high wear resistance (page 773) that are ideal for application in ink-jet recording head.

### ***Response to Arguments***

3. Applicant's arguments filed 2/16/2007 have been fully considered but they are not persuasive.

With respect to amendments to claim 2, they are rejected under 35 U.S.C. 112, first paragraph (see arguments on page3), and therefore not considered in this office action.

Applicants' arguments asserting that the combined reference of Terui and Sato do not meet all the limitations of claim 2 are not persuasive. The deficiency of Terui's disclosure for not using ammonium fluoride to etch a protective film is overcome by the teachings of Sato. Terui discloses the step of removing projected end portion of said protecting film (col.2, lines 1-5). One who is skilled

Art Unit: 1765

in the art at the time the invention was made should be able to apply the teaching of Sato to layers using similar steps.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wakashima (US patent No. 6,708,398) discloses substrate for use in package of semiconductor device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maki A. Angadi whose telephone number is 571-272-8213. The examiner can normally be reached on 8 AM to 4.30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dr. Maki Angadi  
Examiner, Art Unit 1765

LAN VINH  
PRIMARY EXAMINER

